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FLORIDA CITRUS DOMINATES

With the federal estimate this season forecasting a crop of Florida oranges, which they say will reach 99 million boxes, the prominence of this state in the production of citrus continues to make steady progress as the leader of the nation and the world in the production of this great fruit, which is steadily becoming more and more a part of the daily diet of the millions of our citizens.

Many years ago it was customary for Florida's citrus growers to depend to a large extent upon the ability of Nature to develop their crops, but with the steady increase in production and the growing demands of a constantly increasing number of discerning consumers, it has behooved the grower to produce by means of the most modern cultural practices the finest fruit possible.

The development of citrus juice in many forms has become constantly more important in our marketing program, so with both production and consumer markets growing steadily, the importance of Florida growers is gaining stature all the time as the biggest source of supply in the world market for citrus.

VOL. 42 — NO. 11 NOVEMBER, 1961 BARTOW, FLORIDA

Leland Bryan (left) Lake Garfield nursery production manager, inspects a block of Murcotts on rough lemon with A. G. Mann, Bartow.

INSPECTION IS IMPORTANT!

Inspection by the proper state agencies is important, of course, but when one is buying a lifetime investment such as citrus nursery stock, we advocate a more thorough inspection personally by the purchaser. Come to the nursery and look at the trees. Inquire about the source of budwood. How have these trees borne so far? Above all, don't let price be a major influence in your purchase. Cheap trees remain cheap throughout their lives. It makes no difference how good your land is, if your nursery stock is of poor quality your grove will never reach its greatest potential.

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Citrus Insect Control For Winter 1961-62

W. L. Thompson

W. L. Thompson
W. A. Simanton
R. B. Johnson

W. A. Simanton

Florida Citrus
Experiment Station
Lake Alfred,
Florida

R. B. Johnson

This year, citrus rust mite has been the most troublesome fall pest and will continue to be a problem throughout the winter in about 50 percent of all groves. Citrus red (purple) mite and Texas citrus mite populations are unusually low this fall. Both species will increase in November and December and at least 20 percent of all groves will have damaging infestations at some time during the winter. Within the past three years the Texas citrus mite has spread considerably and has been found in a majority of groves throughout the citrus belt. All of the mites mentioned above can cause firing, mesophyll collapse and leaf drop if infestations become heavy in the winter months. Many groves are suffering from inadequate moisture this year. In such groves, the leaf damage following dry winds will be much more severe in groves that have mite injury.

Purple scale and red scale, although present in more than half of commercial groves, have been held to non-economic levels by effective parasite activity. Only occasional spotty infestations are expected to become a problem this winter. Sulfur, and especially lime-sulfur, are harmful to the scale parasites. Use of these materials should be restricted in groves where scales are a potential threat.

Beginning in January, observation should be made for buildup of six-spotted mites.

Spray Program

During November and December mite control will be the most important operation in the spray program. As usual it may be necessary to spray a few groves for the control of red scale. However, where either red or purple scale appear to be threatening, it would be a good idea to examine the scale carefully to determine whether it has been parasitized. Emergence holes of the parasite can be seen in the armor of the scale. Grasshoppers and plant bugs may be a problem in some groves. January is a good time to check groves for scale and mite infestations and to review the past year's spray program to determine how improvements can be made for the coming year.

MITE CONTROL: Tedion is the preferred miticide for control of spider mites (citrus red mite or purple mite and the Texas citrus mite) from the first part of September to about mid-November because it offers the best chance of lasting until after bloom. Tedion does not control rust mite, however, and must be accompanied by Chlorobenzilate or sulfur and zineb. For this reason, a combination miticide such as Trithion or Ethion is less expensive. These materials control both rust mite and the spider mites and although they should not be expected to last from September or October to post-bloom, they usually control mites from late November to post-bloom. Thus the preferred material for control of rust mite and the spider mites during late November and in December is 0.5 pint or 1.0 pound of either Trithion or Ethion per 100 gallons. After mid-December, however, Trithion, Ethion, 1.0 pint of Kelthane or 1.0 pint of Delnav are all likely to control rust mite and red spiders until post-bloom. Thorough coverage is necessary with all of these materials.

There is a waiting period between spraying and harvest of 30 days with Ethion, 7 days with Kelthane and 14 days with Trithion.

The timing of sprays for mite control is as important as the selection of a miticide. Often there is a tendency to delay the application until after some damage has been done. Actually there is little reason to control mites after the fruit is blemished or the leaves start to drop because little or no damage is prevented and mites are usually about to decline in numbers without benefit of chemical control. Another common practice is to delay application until one or more species of mite is numerous with the idea of applying a clean-up spray just before any damage is done. This may be a workable procedure in some cases, but it never produces the longest possible control and often results in failure. On the other hand, it is not wise to spray when mite populations are at extremely low levels, chiefly because this removes any chance of eliminating an unneeded spray. The best results are obtained with recommended sprays to control rust mite and spider mites when there are no more than 2 or 3 rust mites per lens field or more than 15% of the leaves infested with

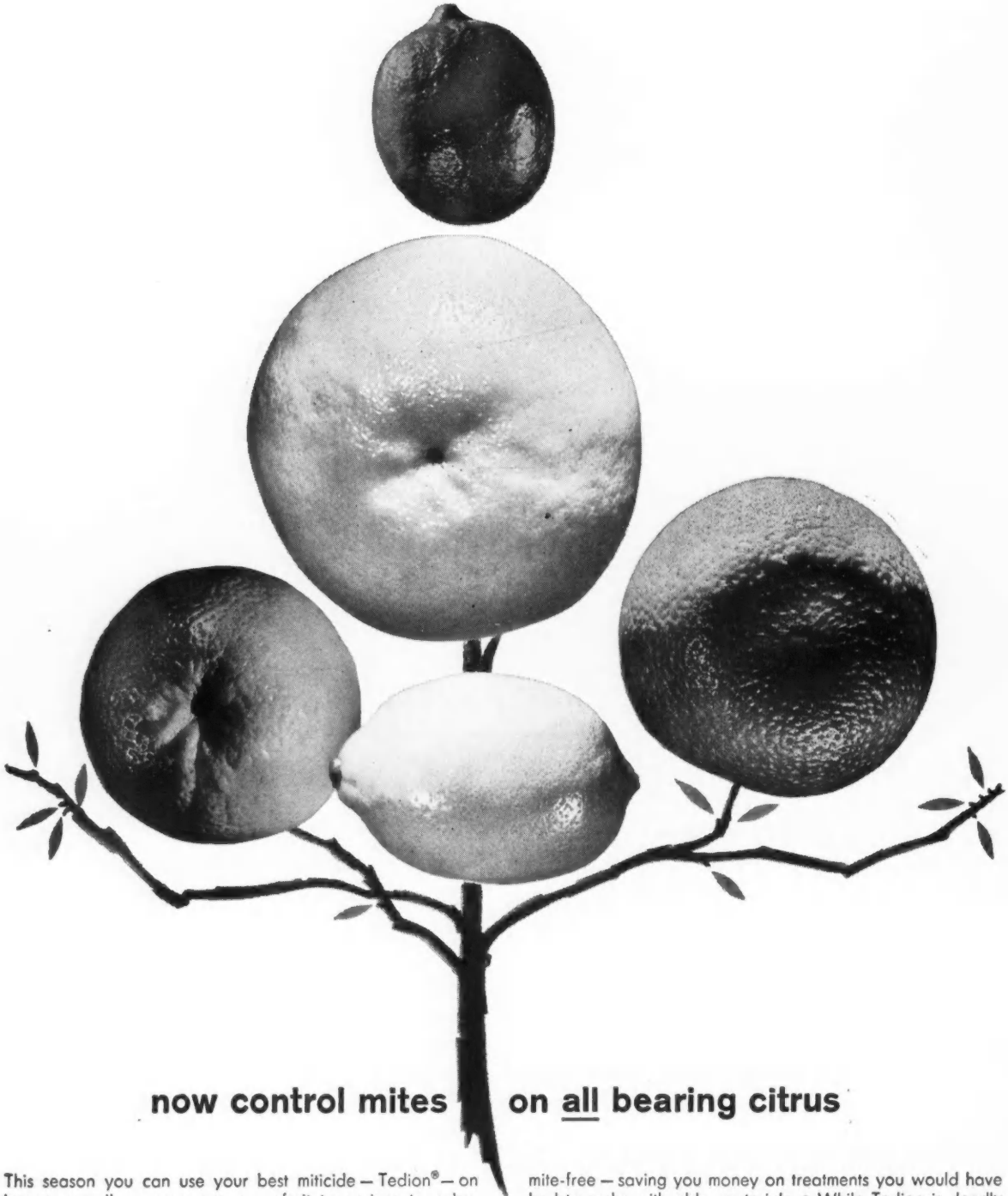
(Continued on Page 17)

SCALE AND MITE ABUNDANCE BY DISTRICTS AT MID-OCTOBER 1961[1]

District	Rust Mite	Citrus Red Mite	Texas Citrus Mite	Red Scale	Purple Scale
West Coast	2.00*	.69	.56	.62	.92
Indian River	1.06	.28	.38	.89	.67
Upper East Coast	.83	.50	.67	.67	.83
Gainesville	2.25*	.17	.50	.33	.17
Orlando	1.16*	.25	.26	.60	.72
Brooksville	1.40*	.53	.20	.31	.81
Ridge	1.19	.35	.19	.84	.76
Bartow	2.44*	.50	.20	.92	.42
State Average	1.40*	.39	.32	.68	.70
Last Year	.99	.34	.15	84	.67

[1]Abundance is computed from the number and intensity of infestations in groves not recently sprayed. Figures marked * indicate threatening conditions.

[1]Written October 20, 1961. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. B. Anderson, Jr., Lake Alfred.



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TECHNICAL CHEMICALS DEPARTMENT, NIAGARA CHEMICAL DIVISION, FMC CORPORATION, MIDDLEPORT, NEW YORK

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A Management Approach To Cold Protection . . .

. . . BY . . .

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Various writers have mentioned the fact that citrus fruits apparently attain their greatest degrees of quality (in the northern hemisphere) when grown near the northern limits of the citrus-production area. Although actual proof of such a statement is lacking, mention is often made of the high quality of the Pineapple orange in the vicinity of Citra (its place of discovery) as compared with its quality in warmer locations, and of the generally poorer maturity and grade qualities of citrus fruits grown in the tropics.

Be that as it may, the quality of the fruit is not an unalloyed advantage since one is forced to recognize the greater vulnerability to damages from low temperatures as one approaches the northern limits of plant species. Within the entire citrus belt of Florida there are few locations which do not possess potential problems from low winter temperatures.

Along about the first of November each year, as the Federal-State Frost Warning Service resumes operations, every grower begins to wonder what the winter will bring in the way of cold weather. Will there be a recurrence of the lows of 1894-95, or 1939-40; will the period resemble that of 1957-58 with its broken pattern; or will the winter be one for the tourist to write home about?

No grower can but be somewhat anxious to know what the winter will bring. Certainly, he is well advised to be prepared for what may come, for no one has learned how to prevent the large masses of cold air from descending upon the state. It is true, however, that many growers over-optimistically calculate the possibilities of changing the air temperature in their groves by firing, or by the use of water or wind machines, or by other methods.

Such growers, without due consideration of the conditions under which they are operating, are apt to fail to realize what results they may possibly obtain, and at what costs. Were they actually to investigate these two points, they might often come to the conclusion that the greatest benefits from all the expenses have been of psychological value to themselves. If one is happier when he is doing something (and isn't that characteristic of humans?), then let us not interfere with his feeling of satisfaction through his artificial control of the weather!

But perhaps, though, a person could be expected to look more or less realistically at cold protection from a management standpoint, i.e., from the point of view of evolving a plan for a long-range program, recognizing all of its limitations, with the expectation that profits will eventuate with time. Isn't this better than lighting a fire or turning on a wind machine at the approach of low temperatures without any over-all plan, and certainly with no idea of what the real monetary returns will be?

Often a person will resist projecting plans into the future for these reasons. First, there is no ideal situation which will allow perfect control by man and there is no possibility of a truly ideal program which will be sound under all situations. Second, it is impossible to know exactly what is in store for a location in the way of weather conditions although past records serve as good guides. Third, a grower's efforts are often feeble

when he attempts to change atmospheric conditions even over such a small area as encompassed by his grove.

In spite of these known facts, a small amount of planning, which may change the situation but very slightly, may turn a loss into a profit. By no means must this be interpreted to mean that under all circumstances will artificial weather control be profitable if planning precedes the operation, for it is entirely possible that such plans may warrant no artificial cold protection.

Let us look at cold protection from the viewpoint of management planning.

The first lines of defense against damages from cold weather must continue to be those which are offered by NATURE or which can be adopted with little or no extra expense. By full utilization of one's knowledge in these areas, one is able, as it were, to support NATURE in her desire to be bountiful. Along such lines are the following items.

1. Location of site with reference to natural cold protection and with abandonment of those portions which are regularly subjected to damages. Good sites are hard to find today, yet any slight advantage must be calculated in choices.

2. Selection of rootstock and scion varieties with due respect to relative cold-hardiness, yet also recognizing that choices must be based on other factors as well. Often relative cold-hardiness between varieties may be small although this factor may still prove important.

3. Production programs, throughout the year, which will bring about maximum tree health and good winter dormancy. Here is the great area for the play of the grower's knowledge of tree reactions.

4. Market programs which relieve the trees of fruit in areas where damages from low temperatures are most possible and often force the picking date to a slight disadvantage from the standpoint of the market. Fruit handlers have little or no direct interest in the grove itself but all of them recognize the value of a happy, prosperous industry.

When a grower has thoroughly considered the above points he begins to recognize the extent to which he depends upon a 'benevolent NATURE. He is forced to the realization that without an assist from natural conditions, or without adaptations on his part, as far as possible, he is simply "floating with the wind."

If, at this point, the grower takes into consideration the fact that he cannot change appreciably the air mass, he may feel justified in taking the more immediate steps toward protecting his trees and his crops from cold. Regardless of what method (firing, irrigation, or wind machines) he will consider for creating the artificial conditions, the steps will be comprised of five decisions.

1. Is the possibility of profit within the reach of commercially feasible operation? There is one of three chances to be considered: any method will entail more costs and management efforts than the slight gain which might be expected under rather satisfactory grove conditions; any expenses incurred will not be expected to change a very unsatisfactory set of conditions sufficiently to offset expenses, let alone return a profit; or, any reasonable and intelligent planning can be expected to prove economically sound.

2. What does the grower hope to accomplish? Will he hope to protect the bloom, the fruit crop, or the tree; or, will he take measures whenever the temperature approaches a predetermined critical point? Planning must not be of a "scatter-shot" type which presumes that somehow, and in some way, some benefit may be obtained.

3. How much and what type of equipment must be purchased? One must suppose that each situation will show particular advantages for certain types and amounts of equipment and that the choice of properly tailored equipment will give most chance for profits.

4. What will be the pattern of installation within the grove? Here the grower's knowledge of his grove is allowed an interplay with information from the research horticulturists and the engineer's knowledge of the capacity of his equipment. Proper installations will result in better returns with less equipment; therefore lower costs and better margins of profit.

5. What will be the general plans for operating? With the best available information from all sources including the knowledge of the grove, plans should include starting times and stopping times as well as methods of properly maintaining the operation with adequate personnel, equipment, and fuel.

Intelligent planning of a cold protection program must recognize that such a program will not overcome all adverse conditions but that it will minimize the chance of poor results. In January of 1940, because of the protracted siege of low temperatures, operations fell far short of success. Even the expenses incurred during the first few nights failed to be returned to the grower because fuel was not available to handle the operation during the last nights of the cold period. Some growers have experienced the ability to adequately take care of the estimated acreage under control for one or two nights but have found that, through lack of proper planning, stresses upon personnel and machinery force reduced operations for longer periods.

That planning brings better results, even when full protection is not afforded by the methods used, is evident when one considers the length of time necessary to re-establish the trees for fruit bearing after cold damages. Planned programs may entail less costs than helter-skelter methods.

It is most difficult to appraise the value of any particular cold protection method for there are no easy ways for making comparisons with the same groves had no methods been used. Yet, appraisals must be made as an estimate of efficiency if for no other reason. Therefore, comparisons with situations as near like those of the protected grove are in order as a best substitute, even though the grower must realize their limitations.

As long as citrus is grown in Florida cold weather can be expected to cause damages to tree and crop. By logical decisions and intelligent management damages can be kept to a minimum. No human can hope to change natural atmospheric conditions greatly but thinking growers can ameliorate certain of the most disastrous consequences resulting from lack of understanding of such natural conditions.

Florida citrus growers are fortunate in being able to obtain new information concerning both the reactions of the citrus tree to low temperatures and the effects of various cold protection methods through researches being conducted by the staffs of the following organizations: the Citrus Experiment Station, in cooperation with the Florida Citrus Commission, at Lake Alfred; the Fruit Crops Department of the Florida Agricultural Experiment Station at Gainesville; the United States Department of Agriculture Field Laboratories at Orlando; and the Federal-State Frost Warning Service of the United States Weather Bureau at Lakeland. Several commercial companies are helping in fostering some of this work and are bringing engineering knowledge into focus.

Use a cutting board when chopping or slicing foods. This helps keep a keen cutting edge on the knife blade—and it's safer, too.

Influence of Weather Conditions On The Absorption of MH-30 By Young Citrus Trees

. . . BY . . .
C. H. HENDERSHOTT
FLORIDA CITRUS COMMISSION
AND CITRUS EXP. STATION

Application of MH-30 (maleic hydrazide) to young citrus trees in both the 1959-60 and 1960-61 seasons to a large number of experimental plots resulted in a wide variation in response of the trees to the material.

During the 1959-60 season applications of 1000 ppm (parts per million) to young citrus trees the first week in November resulted in a delay in growth response for approximately 30 days while an application of 2000 ppm resulted in a delay in growth for approximately 60 days. However, during the 1960-61 season one application of 1000 ppm the first week in November resulted in a delay in growth of young trees until May, while 2000 ppm delayed growth as late as July in some cases.

The questions "What caused this difference in response between the two years?" and "Why would this material act in such an eratic way?" are very appropriate. In attempting to answer these questions, it is well to consider the nature of the chemical itself. MH is a member of a group of chemicals commonly referred to as "growth regulating" chemicals; i.e., they alter the growth of the plant in some way.

The action of this group of chemicals depends on their absorption into the plant in sufficient concentration to exert their effect. The absorption of these materials is in turn influenced by such factors as temperature, relative humidity, soil moisture supply, initial spray load (i.e., the amount of material actually applied to the leaf surface), and the time of application. In analyzing the situation, attempting to determine the cause of this variation, two of the above factors can be eliminated since the material was applied both years at approximately the same time of year and at the same concentration. There remains then only those factors which are influenced by weather conditions.

The week following application in 1959-60 was characterized by two days of cool weather moving into the area 24 hours after application. Temperatures ranged from 55-60° F. with relative humdiity ranging from 80-100 per cent for 12 hours each day. Then temperatures increased to 75° F. during the day and 60-65° F. at night with relative humidities of 80 per cent or more for 12-14 hours per day. The week following application in 1960-61 was characterized by relative humidities ranging from 60 per cent and below during the day to 100 per cent during the night.

There were 12-14 hours each day in which the relative humidity was 80 per cent or more. Temperatures ranged from 80° F. in the daytime to 60° F. at night. Therefore, the variation in temperature and relative humidity does not seem great enough to account for a large difference in the amount of material absorbed.

There remains then only rainfall and soil moisture supply which may have influenced MH absorption. Turgid plants, i.e. plants with a high moisture content, absorb at a faster rate than non-turgid plants. Low rainfall would result in low soil moisture and indirectly cause a lower moisture content in the plant; i.e., less turgidity which would result in slow absorption.

In the year 1959-60 there occurred 8.29 inches of rain in October and 0.98 inches in November. During 1960-61, there were 1.92 inches of rain in October and none in November. The two weeks preceeding application in 1959-60 had no rainfall; however, one-half inch of rain occurred three days after application which removed any unabsorbed MH remaining on the leaves. The week preceeding application in 1960-61 had 0.75 inch of rainfall and no rainfall occurring after application for over a month.

It would appear from the above review of weather conditions prior to and after application in November of each year, that the only major difference was two weeks of dry weather preceeding application and the occurrence of rain three days after application in 1959-60.

Data collected and published elsewhere indicate a rain-free period of four days would be required before assurance of maximum absorption of MH had occurred. Therefore, one big difference in the performance of citrus between the two years was due to the fact that more MH was absorbed in 1960-61 than in the 1959-60 season. In 1960-61, application was made four days after a 0.75 inch rain with no rain following, but in 1959-60, even though October was rather wet, application was made after a dry period of two weeks, and was followed by rain.

It would appear then that low soil moisture which reduced absorption plus only three days before rain was sufficient to cause a low level of MH in the tissue thus resulting in a short term inhibition, compared to the 1960-61 season.

The use of this material for retarding growth of young citrus trees is recommended for limited trials only until a more uniform absorption can be obtained. For these trials, it is suggested that no more than 1000 ppm (1 quart of the commercial MH-30 in 100 gals. water) be applied. This application can be made anytime during the month of November and preferably when the soil moisture level is high. Under no circumstances should this material be applied to trees producing fruit for utilization. Research has shown that fruit produced from trees sprayed with MH-30 may be coarse, pear-shaped, thick skinned and low in juice content.

Business Notes

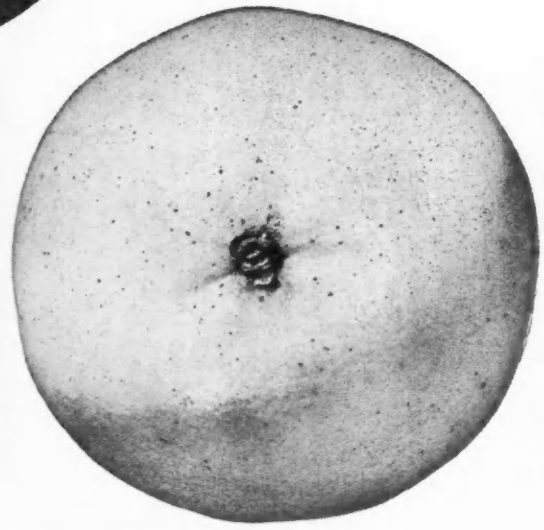
FLORIDIANS TO BE GUESTS OF WEEKI WACHEE

All Florida residents are invited to be the guests of Weeki Wachee, Florida's famed attraction on the West Coast, during the entire month of November to see the new Mermaid show, "Underwater Circus."

Residents may identify themselves with a Florida driver's license, or similar identification, and will be admitted to see the new underwater show, upon payment of a small service charge. Children under six will be admitted FREE.

The Weeki Wachee management announced that the invitation is the second of its kind in the history of the unique attraction, whereby residents of the state are able to enjoy the panoramic view of the underwater spectacular, while comfortably seated in the luxurious, air-conditioned million dollar aqua-theatre.

ethion



ETHION KILLS MITES ON BOTH ORANGES AND GRAPEFRUIT. This powerful new miticide has been approved by the U. S. Department of Agriculture for control of all major mite pests on both oranges and grapefruit. With ethion, you get quick kill and long-lasting control of citrus red mite, rust mite, Texas citrus mite, and other mite species. In addition to outstanding effectiveness, ethion gives you: **Economy.** Ethion costs less to use and its extended residual activity spreads your spray dollar. And because you apply it on oranges and grapefruit, ethion saves by simplifying your program. **Mildness.** Ethion has no adverse effect on developing fruit or foliage. It allows fruit to develop fully and naturally for bumper crops free of spray damage. **Safety in Feeds.** When ethion is applied according to label directions, pulp may be used for animal feeds.

TECHNICAL CHEMICALS DEPARTMENT, NIAGARA CHEMICAL DIVISION, FMC CORPORATION, MIDDLEPORT, NEW YORK

Some Significant Fertilizer Records In The Short Research Grove

. . . BY . . .

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TECHNICAL DIRECTOR
SOIL SCIENCE FOUNDATION,
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The year in and out practice of applying liberal fertilizer to citrus poses a question among some growers regarding what becomes of all this tonnage of fertilizer over the years. Such questions are logical and within reason for intensified agriculture in any area, and especially Florida sands, in order to avoid complications which are more difficult to correct than to prevent.

It is not difficult for the grower to understand that open sandy soils permit water to penetrate readily, and if soluble fertilizers are used (and most are soluble, to be classified and accepted as available), they go down with the rain if and when it comes. A certain percentage of fertilizer nutrients are removed in the crop. This ranges from 25 to 50 percent of the nitrogen and potash, to less than 1 percent of some of the trace minerals. The questions regarding differential leaching of nutrients, crop removal and soil fixation have been studied by numerous workers over the past three decades, and the interrelation of nutrients to different soils has been reasonably well established. To ignore the established facts means added costs and risks.

Strange as it may appear, only two of the major nutrients, nitrogen and potash, and one trace mineral, boron, leach from sandy soils in sufficient amounts to cause concern. These are the only nutrients requiring supplements for leaching losses. Soluble magnesium leaches to some extent, but not like nitrogen. Chlorine leaches readily, but it is not considered as a necessary nutrient in citrus fertilizer. All the other nutrients are retained by the soil, resisting leaching to a remarkable degree on sandy soils, even when applied in water soluble form. These records apply to a high percentage of Florida grove soils.

Growers can depend on the established facts that phosphorus, copper, iron, manganese and zinc do not leach very much even from sands, and calcium and sulphates combine in the soil and leach sparingly. The build-up of nutrients over the years may be an asset in some soils and a liability in others, depending on the nature of the soil and extent of build-up. In practice, nitrogen, potash and boron are the only nutrients that require regular supplements to replenish leaching losses.

One of the major objectives of the Short Research Grove* established in the early forties, was to study these problems and determine to what extent they had practical applications on Lakeland sand, the dominant citrus soil in the ridge. Systematic records over the years have revealed some worthwhile records of practical value. One of these show that the rates of fertilizer may be in excess of needs, without showing any evidence of tree strain, leaf burn and or drops. This is not easy to understand, but the records cannot be ignored because they are more than of casual observation. Careful evaluation of all available records indicates that these depressing effects were due more to excess potash and nitrogen salts than the other nutrients; yet they are the ones that leach and do not cumulate. See plate 1. That the nutrients vary in their leaching and cumulation is clearly indicated in Table 1. To a reasonable degree, all of the phosphorus, copper, manganese and zinc applied to these soils can be accounted for in soil reserves plus crop removals. But this is not the case with nitrogen and potash. Yet, they are the nutrients responsible for retarding tree growth and production.

In view of these records, it is logical to assume that hindrance from soluble salts would be more severe during years of scant rainfall than during years of heavy rainfall. This means that liberal amounts of soluble fertilizer might be injurious without visible effects to trees during dry periods.

Because of the risk of root injury from soluble fertilizer sales during dry

(Continued on Page 11)

* The Short Research Grove is owned and operated by Soil Science Foundation, a non-profit grower organization.

FLORIDA CITRUS NURSERYMEN NAME OFFICERS AT ANNUAL MEETING

W. R. McMullen, Tampa citrus nurseryman, was re-elected president of the Florida Citrus Nurserymen's association at the group's annual meeting held in Winter Haven.

Other officers named include W. G. Adams, Winter Haven, first vice-president; John H. Kauffman, Jr., Eustis, second vice president; L. W. Clements, Jr., Bartow, secretary-treasurer. Directors are W. Erle Camplin, Arcadia; Burt Colburn, Goulds; George O. Nordmann, Deland; G. F. Ward, Avon Park; Cecil Bishop, Brooksville; Albert C. Crosby, Valrico; and R. G. Pitman, Jr., Apopka.

Dr. Herman J. Reitz, director fo the Citrus Experiment Station, Lake Alfred, introduced to the members a new member of the station staff, Dr. George Ryan, who comes to Florida from California.

Dr. Ryan, Dr. Reitz stated, will devote about two-thirds of his time to research on problems concerning the production of citrus nursery stock. He will work closely with the FCNA research committee, which is headed by Dr. J. T. Griffiths, of Winter Haven.

Members heard Dr. Kenneth Corbett, of the University of Florida, Gainesville, speak on the use of the electron microscope in virus research. A panel discussion was conducted concerning the development of Trifoliate rootstock in Florida. A box lunch was served to about 40 members and guests.

Next meeting of the association is scheduled for Thursday, January 4, 1962. Site of the meeting will be announced later.

There Is A Difference In ZINC!

Tennessee's **NU-Z** – Neutral Zinc Manufactured Under A Patented Process*

*Manufactured under U. S. Patent No. 2,602,727.

CITRUS GROWERS GET BETTER RESULTS WITH TENNESSEE'S **NU-Z.**

NU-Z Never causes spray burns – Complete correction and prevention of Zinc deficiency (Frenching).

NU-Z is compatible with other spray materials – Residue on leaves held to a minimum.

For Highest Quality And Dependable Performance Insist On Tennessee's NU-Z.

TC TENNESSEE CORPORATION

SOME SIGNIFICANT FERTILIZER RECORDS IN THE SHORT RESEARCH GROVE

(Continued from Page 9)

weather, it is logical and safe to use nitrogen only, with little potash, until the rains come, thereby reducing the salt effect. Potash reserves in the tree and subsoil will carry trees over several months with no unfavorable effects. The records in Table 1 show a build-up of trace minerals, yet mere traces are used by the crop — ounces rather than pounds per 1000 boxes of fruit. To continue adding these nutrients leads to excesses which may become a hindrance.

Numerous records indicate that copper has been built up to excess in many soils, thus hindering the utilization of other trace elements, especially iron. Furthermore, the records in the Short Research Grove show that trees have produced normal crops (free of copper deficiency symptoms) for 18 years without added copper. It is difficult to understand that copper in the spray and fertilizer the first year (1940-1) could furnish tree needs all these years. Soil tests have shown very low amounts of available copper at any time. This is partially explained by the fact that the crops remove small amounts of copper (8 to 10 parts per million), and that the nutrients in the soil have been reasonably well balanced.

Other significant and surprising records from this Research Grove under continuous observation for 18 years, may be listed as follows:

1. All soluble nitrogen has produced as good crops as 40% insoluble organic nitrogen during the November and June applications.
2. With adequate boron, zinc and manganese, excessive amounts of lime (sufficient to maintain soil pH above 7.0) have produced good trees and smoother fruit than normal treatment with pH of 6.0 to 6.5.
3. Periodic applications (five year intervals) of super phosphate have produced 5 to 8 percent greater yield than equal rates in the fertilizer three times per year.
4. A good portion, if not all of trace mineral needs can be furnished from ores and slags.
5. That .35 lb. of nitrogen is sufficient per box of Pineapple oranges on Lakeland soil.
6. That high amounts of potash in the fertilizer will not increase cold resistance to citrus trees.

TABLE 1 — TOTAL SOIL NUTRIENTS IN LAKELAND SAND AS AFFECTED BY DIFFERENT FERTILIZER TREATMENTS

(Data taken from Short Research Grove, 1935, Represent Averages in Pounds Per Acre For the Plots Indicated.)

Plot No.	Treatment*	Soil Depth	pH	Calcium	Phos. Acid	Potash	Manganese	Copper	Zinc
1, 21, 36	Standard 6-4-8	0-12	6.0	1208	913.5	172.5	115.2	36.7	54.3
45, 59, 62	Checks	12-24	5.2	115.3	351.0	147.0	15.6	4.6	22.1
		24-36	4.7	80.5	280.5	126.0	15.2	1.7	19.0
17	Std. except no Phos. Acid	0-12	6.2	1088	324	185	76	27	43
		12-24	5.4	72	216	128	12	8	16
		24-36	5.1	92	144	160	12	3	11
24, 68	Std. exc. no Potash	0-12	6.1	2048	1176	174	98	24	46.5
	6-4-0, 40% Org.	12-24	5.3	128	324	144	17	4.5	18
	N - Nov.&June. Std. N - February	24-36	5.2	97	264	140	17	3	18
35, 72	Std. except no	0-12	6.0	1000	840	188	83	8	27.5
	copper, no zinc	12-24	5.2	110	390	136	12	4	20
		24-36	4.9	104	311	120	13	tr	16
30, 55	Std. with 3	0-12	5.9	1792	1188	200	155	78.5	71
	times copper	12-24	5.1	124	318	120	16	4.5	22
		24-36	4.9	98	288	120	14	tr	20
6, 38	Std. except no	0-12	5.2	1136	1164	152	76.5	33.5	37
	soluble magne-	12-24	4.7	86	318	116	13	6.0	13.5
	sium, no dolomite	24-36	4.6	114	294	120	12	3.0	11

* Standard fertilizer consisted of 6-4-8-2-.5-.25-.2-.1 (N-P_2O_5-K_2O-Mg0-Mn0-Cu0-Zn0-B_2O_3, respectively), applied in the following manner: 40% of annual need in November and 30% Sulphate and Muriate of Potash. The secondaries were derived from Sulphates and Borates, each in February and June. Seventeen percent of the Nitrogen in the Standard was derived from insoluble organic sources, and the remainder derived equally from Ammonia and Nitrate Nitrogen. The Phosphorus was derived from super phosphate and Potash from Variations from Standard are shown under plot treatments.

Citrus Agricultural Production Brings In Millions To Producers

Florida has such a wide reputation for glamor, i.e., gorgeous girls in scant swim suits, fast or slow horses depending upon how your bets come out, greyhound tracks, international auto races, swaying palms, etc., that so many folks conclude sunshine is about the only crop the state raises.

Thus, a few statistics from Dr. D. L. Brooke, associate economist of the Florida Agricultural Experiment Stations, may come as news to these winter visitors. In 1960, this data (which includes citrus statistics for the 1959-60 season) shows, Florida farmers received a total of $808 million for their products. These products include besides citrus, Irish potatoes, watermelons, strawberries, tomatoes, okra, salad greens, lettuce, radishes, onions, snap and pole beans, corn, sugar cane, tobacco, cotton, peanuts, sweet potatoes, livestock, nursery specialties ad infinitum.

Citrus "farmers" alone received $227 million on-tree for their oranges, grapefruit, tangerines, and other varieties of sunshine fruit, according to the Brooke data. Citrus was the big crop of Florida "farmers", accounting for 34 per cent of the total Florida farm income.

Florida Citrus Mutual's Bob Rutledge estimates that on-tree citrus returns for the season just past, 1960-61, hiked up past the $300 million mark for an all-time record. This despite the fact that the 1960-61 citrus season was ushered in by Hurricane Donna, which blew away as much as 85 per cent of the fruit in some groves in the hardest hit areas.

"When you take into added account the packing and shipping and processing operations, plus the many gift fruit concerns, Florida citrus is a good bit more than a billion-dollar industry," Rutledge observed.

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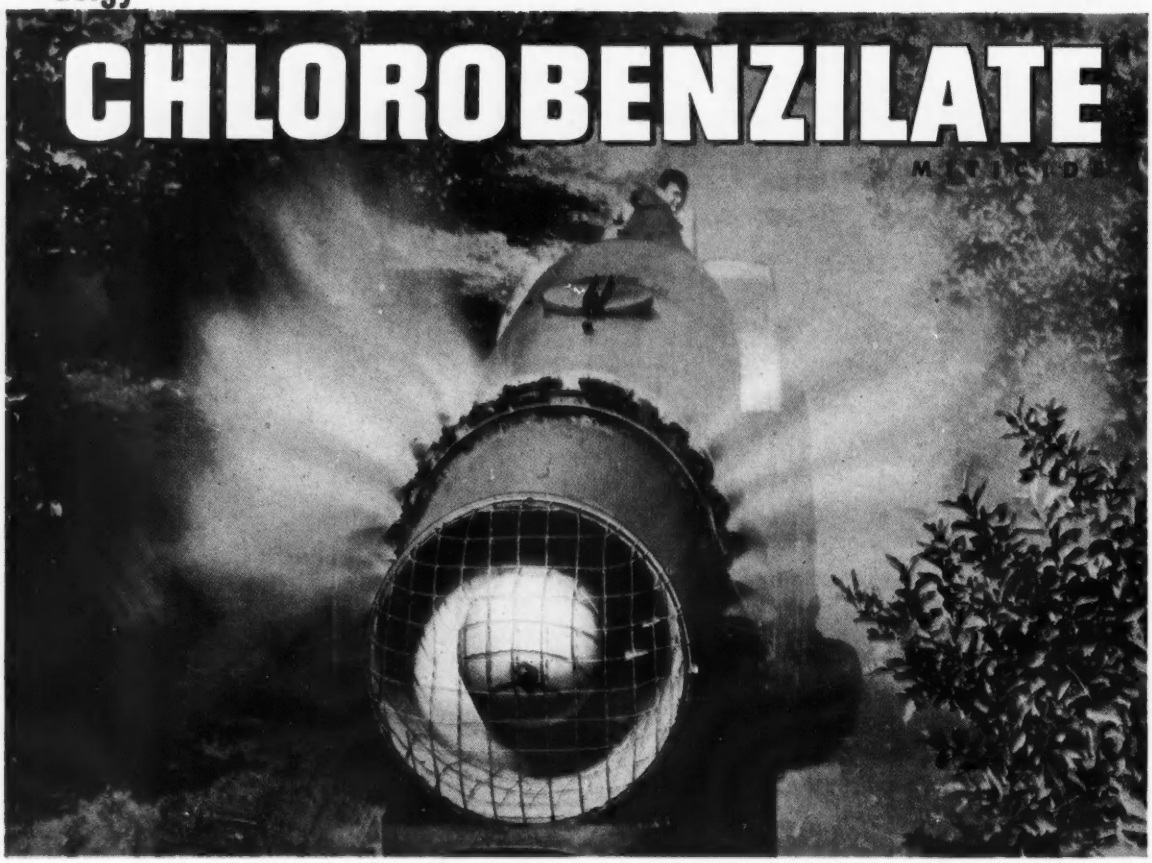

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The Principals Of Cold Protection

. . . BY . . .

JOHN F. GERBER
ASSISTANT CLIMATOLOGIST
UNIVERSITY OF FLORIDA
GAINESVILLE, FLORIDA

Protection of plants from cold and freezing damage has been the problem of the horticulturist for many years. In climates such as Florida's this problem is magnified by the growing of subtropicals and by the production of early season fruits and vegetables. Significant improvement in the reduction of cold damage risks can be achieved if suitable methods of cold protection are used.

A review of the fundamental physical principles of heat transfer may enable one to provide more intelligent and effective cold protection. Cold protection consists of stopping or slowing the rate of heat loss. Since heat is lost in three general ways it is well to know about them. The flow of heat into or out of the plant by direct contact with other objects or with the air very near the plant is heat loss by **conduction.**

Since the plant parts do not conduct heat very readily this type of heat loss is not very important. That the plant is a poor conductor of heat can be shown by comparing soil temperatures and leaf or limb temperatures on a cold night. On such nights the soil temperature six inches below the surface may be 50 to 60 degrees while the leaf temperatures are often 25 to 30 degrees.

Heat is also carried away from the plant by air which is cooler than the plant. If the air is in motion, it is called wind and the loss of the heat by the wind is loss by **convection.** Heat can also be added by convection if the wind is warmer than the plant. Heat loss by convection can be very important on cold windy nights. On the other hand, cold damage is less likely to occur on a windy 28 degree night than on a clear, calm 28 degree night. This occurs because air colder than 28 degrees may accumulate near the surface on calm nights, but would be mixed with other air on windy nights.

Radiation is the loss of heat from the tree or any other object by invisible light or heat rays known as infrared. While one cannot see infrared rays, one can feel them. Radiant heat is emitted from the sun, from a hot stove and from every object in the universe. The hotter the object the more heat is radiated. Radiation and convection together account for most of the heat movement both into and out of the plant.

At night the temperature in a grove falls because heat is lost from the surfaces of the soil and plants. When the sun sets the radiant heat supply from space is shut off. For practical purposes the sky is now cold empty space. The infrared rays from the surface shine out through the air and are lost in space. As this proceeds the soil and plant surfaces cool. Since air does not lose or gain heat by radiation nearly as fast as the soil and plant it remains warmer.

Heat from the air molecules next to the surface is transferred into the soil or plant which is cooler. This heat is again radiated out to space. Thus, the air near the ground becomes cooled. The cooling of the air has slowed its molecules. They bump into each other less frequently and as a result occupy less space. The air now occupies less space per unit weight than the air about it and is also colder.

In this way a layer of cold air may soon be built up near the ground. If the air and ground are cold enough frost may form. These are the conditions which produce radiation frost and also temperature inversions i.e., air warmer above the tree tops than near the ground and among the trees. If there is not any wind and the terrain is level this condition will persist until sunrise.

If wind is in excess of 3 to 5 miles per hour then the air is constantly mixed much as a flowing stream stirs up the water near the bottom, and the air will be at about the same temperature throughout. If the terrain is not level and the wind is calm then the cold heavier air tends to drain or be forced by gravity into low elevations.

This flow is not even or steady but tends to create small secondary currents or eddies. As the cold air sinks into a depression it forces upward and outward the warmer lighter air which it replaces. The effect is to fill the depression deeper and deeper with cold air as the night progresses. By morning a deep layer of cold air may be found in the depression.

On cold windy nights heat is lost by convection in addition to radiation and conduction. If the wind is very cold a freeze may occur. Heat is lost by conduction to the air near the leaf and this air may be swept away by the wind. This way the plant can be cooled very quickly to the air temperature, but it is not possible to get temperatures much lower than the air temperature in a strong wind. Thus, no damage might be found when the air temperature is 32 degrees at five feet at sunset in a high wind, but severe freezing might occur on a calm night. On calm nights one can expect a great deal of variation in temperatures between different locations and between different heights at the same location. In contrast, on windy nights one can expect fairly uniform temperatures throughout any one location and between depressions and high elevations.

Any way the radiative and convective heat loss can be reduced will afford some cold protection. Convective heat losses may be stopped by warming the air until it is as warm or warmer than the plant. This is one of the basis of orchard heaters. While this method is effective it is not highly efficient since it requires the heating of all the air in the vicinity of the plant until it is at least as warm as the plant. Because of this more heat is used in heating the air than in heating the plant.

If heaters are operated at too high temperatures the heated air will rise

(Continued on Page 15)

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THE PRINCIPALS OF COLD PROTECTION

(Continued from Page 13)

very rapidly and will be lost from the grove. Most efficient heat use with heaters alone can be obtained when there is a strong inversion and a large number of heaters are operated at low burning rates. In this way the heated air may be trapped below the inversion and kept in the grove. Orchard heaters do not stop radiative losses, but they do add heat to the plant by radiation. Radiant heating by orchard heaters is probably as important as the effect of the heated air.

This wind machine has been placed in a slight depression where a prior freeze had killed or severely damaged the trees.

Radiative losses of heat are not easily controlled. In order to stop radiative losses some cover is necessary which will stop the infrared rays from the plant. Clouds are an example of a natural cover which will stop infrared rays and afford cold protection. Smoke will not stop infrared rays even though it stops visible light. If some direct means of stopping radiative heat losses were available, a great deal of cold protection could be obtained. This is the basic reason for covering plants on cold nights.

There are two natural heat sources which may be used to provide cold protection. These are the air and the soil. A good example of the use of soil is the banking of trees. The soil is warmed during the day and stores heat. In addition, it reduces convective and radiative losses from the part of the tree in the bank. Heat storage in the soil may be increased by keeping the soil firm and the surface free from residue which would tend to insulate the soil and keep it from storing heat during the day.

The air also serves as a natural heat reservoir. Heat is transferred to the plant from the air by convection. On calm nights when there is no appreciable wind movement, very little heat from the air is used in warming the plant. Under such conditions large temperature inversions occur. Air temperatures at 50 feet above the ground may be 5 to 10 degrees warmer than at 10 feet above the ground. Wind machines can be beneficial under such conditions.

Experience at the University of Florida over the past 3 seasons indicate that two degrees or more of protection can be expected from an 85 to 100 horse power wind machine on clear, calm nights. Wind machines do not add any heat to the grove but simply make the heat already present in the air more available. On cold, windy nights wind machines cannot be expected to give much protection. However, during the past three seasons the coldest nights at Gainesville with few exceptions occurred during nights which were clear, calm and accompanied by inversions. Any method which will keep cold air from accummulating around the plant will afford some protection.

Wind machines and heaters together provide the most efficient and effective cold protection under all conditions. Heaters build up the heat supply in the air and radiate heat directly to the plant. The wind machines help distribute this heat and keep the air at a rather uniform temperature through the grove. While such a system may not always be economically practical, it will provide the maximum benefit from fuel burned and hours of wind machine operation.

Recently some interest has been given to the use of irrigation for cold protection. Ice formation from liquid water is accompanied by the release of rather large amounts of heat. This heat can be used to maintain the plant at the freezing temperature of water as long as liquid water is being frozen. Once all the water is frozen the temperature will again fall. Success with this method of cold protection has been very good with low growing plants and with nursery stock.

Care must be exercised to insure that irrigation is continued until the ice is melted or the air temperature is sufficiently high to quickly melt the ice. Experience with this technique in bearing citrus trees is very scanty. Reports from isolated instances vary, but in all cases breakage has been reported and in most cases has been severe. If rates used are the same as those used for irrigation several thousand pounds of ice could accumulate on a tree in several hours and would undoubtedly be disastrous. Therefore, this practice cannot be recommended.

Currently research is underway by the Department of Fruit Crops, University of Florida at Gainesville which is hoped will provide much more specific information about problems of cold protection. Present knowledge, while not complete, does enable the grower to make decisions based upon sound principles even though specific information may be lacking.

Any method which will modify heat loss is worthy of consideration. It must always be borne in mind that only methods which supply additional heat can be expected to provide adequate protection in extremely cold weather. Heaters alone give very satisfactory protection if they are correctly used.

However, experience has shown that wind machines and heaters to-

(Continued on Page 16)

Internal Quality Of Citrus Crop "Best Ever," Says Rutledge

The 1961-62 Florida citrus crop is shaping up as "one of the best ever for internal quality of fruit although the long drought has retarded sizing of early and midseason oranges and seedless grapefruit," said Robert W. Rutledge, Florida Citrus Mutual executive vice president.

"Florida citrus growers have experienced the dryest nine-month period, from January through September, this year ever recorded by the Weather Bureau," Rutledge said. "This extended dry period certainly will affect this season's citrus crops.

"Although the long dry period, especially in August and September when fruit normally grows rapidly, has affected fruit size, internal quality of all varieties is of the best ever."

Reporting on a survey of growing conditions recently completed by Mutual's field staff in 15 citrus-producing counties and the Indian River area, Rutledge said that irrigation, where available, is being used on "an almost constant basis." He also added that "while general rains would greatly improve tree conditions they would undoubtedly cause a great deal of fruit-splitting."

"However, we are looking forward to a very successful season," he said. "In the meantime, it would seem prudent for all of us to pray for rain."

Excerpts from Mutual's county-by-county survey:

POLK: Soil moisture is almost depleted. Lakes, creeks and ponds are at a low level. Both young and old trees are showing wilt and those damaged by water last year or infested with nematodes show severe wilt. Fruit generally has stopped growing. Some fruit is beginning to soften on the tree and growers fear that if the drought continues there would be heavy fruit dropping, especially grapefruit. There is also concern over possible splitting of oranges if rains do come.

LAKE: Irrigation is being done wherever growers have the facilities, but this relief affects only about 20 per cent of the total citrus acreage. Mature trees in wilted condition and some fruit is showing softness and growers report the fruit has stopped growing. While general rains at this time might relieve the possibility of permanent damage the drought still would affect sizing of oranges. Growers also fear rains would cause

ROBERT W. RUTLEDGE
GENERAL MANAGER
FLORIDA CITRUS MUTUAL

an unusual amount of splitting of fruit. Water table is generally low.

ORANGE: Western and northern parts of the county very dry with growers irrigating where they have the facilities. Moisture situation is approaching the critical point.

SEMINOLE & OSCEOLA: Conditions generally good at present. No excessive moisture but situation not yet critical. Young trees, however, need water.

PASCO: Water table generally favorable due to heavy rainfall of last year. However, surface moisture has depleted rapidly and most growers are having to irrigate young trees. Fruit has stopped growing in recent weeks and definite loss in size is in prospect.

HILLSBORO: Fruit has stopped sizing and some mature groves are in permanent wilt. In the northern and western part of the county the situation is not quite so severe because of one to two inches of rain last week which brought temporary relief. Water table about normal and seems to be remaining constant.

DeSOTO & HARDEE: Drought situation approaching critical point. Considerable leaf curl in non-irrigated groves and early and mid-season oranges appear to have stopped growing. Tangerines have good size for this time of year. Water table generally low.

MARION, VOLUSIA & PUTNAM: Situation not as severe as in central and southern part of citrus belt. However some areas are beginning to suffer and there is a good deal of concern from tangerine growers of Volusia County over the sizing of tangerines and the resulting possible delay in beginning shipping dates.

HIGHLANDS: Lake levels low but because of heavy irrigation and eight inches of rain in August plus two inches in September no apparent loss in fruit size except on Marsh grapefruit and some crops of Hamlin oranges. Other varieties appear to be normal in size for this time of the year.

HERNANDO: Water table generally low but situation not critical. Tangerines not sizing as they should, with light crop on tree.

PINELLAS: Few light rains recently but dry conditions still prevail. Where possible, some growers are irrigating. Fruit has stopped sizing recently.

INDIAN RIVER AREA: Almost all of this section, with the exception of the extreme northern part has suffered loss in sizing of grapefruit and early oranges while Valencias remain about normal in size. Grapefruit has sized very little since July. Scattered showers in the past few weeks have greatly improved tree conditions. The water table is at an extremely low level and canals are affecting the supply of irrigation water. Continuation of this dry condition could have severe results.

THE PRINCIPALS OF COLD PROTECTION

(Continued from Page 15)

gether will provide the best cold protection. Wind machines alone will often provide adequate protection on clear calm nights, but there is no guarantee that this will always be sufficient. Regardless of the method of cold protection best results will be obtained by growers utilizing the principles of heat transfer and loss to their advantage. Thus, one can make a more intelligent approach to the problem of "Protecting Our Florida Plants from the Cold."

Loss of life from farm fires in 1960 was estimated at about 850 by the National Safety Council.

CITRUS INSECT CONTROL FOR WINTER 1961-62

(Continued from Page 3)

spider mites.

The only satisfactory way to determine when to spray is to keep aware of mite populations by frequent inspections of each grove. Both fruit and foliage should be examined for rust mite; green twigs as well as leaves should be checked for citrus red mite and Texas citrus mite. In addition, tree tops as well as lower portions should be checked because mites tend to be more numerous in tops and southeast areas during the winter. As much attention should be paid to mite eggs as to the mites themselves because eggs often are a warning that a mite outbreak is imminent.

SCALE CONTROL: Since there are some spotted red scale infestations it would be well to inspect such groves before applying the miticides and if living scale are numerous, supplement the miticide spray with a scalicide.

Either 0.25 pound of actual parathion or 1.25 pounds of actual malathion per 100 gallons is recommended for fall and winter scale control. Oil is a shock to the trees, makes them more susceptible to cold weather, and may cause them to have a light bloom next year. Oil does not cause fruit to regreen after it is colored, but if it is not fully colored, it will retard or prevent degreening, especially of Valencias. If oil is used on any variety, delay the application until just before growth starts or when there is pinpoint growth. After the young leaves have formed, both oil and parathion are likely to cause injury.

There is a waiting period between spraying and harvest of 14 days with parathion and 7 days with malathion. Parathion and malathion can be mixed with most spray materials, but a mixture of parathion and DN Dry Mix may cause leaf drop and injure the peel on the lower part of the fruit where spray drops collect.

GRASSHOPPER CONTROL: Grasshoppers can be very injurious to young trees by eating a large portion of the foliage. Infestations on trees are most likely to occur after the cover crop has been chopped or disced or the grasshoppers may migrate into the grove from adjacent areas.

Parathion at 0.45 pound actual per acre will give a quick kill, but it has no residual effect. Effective insecticides that do have residual properties, but which should be applied only to trees without fruit, are as follows in amounts per acre: One pound of 25% aldrin wettable powder or 1 pint of 23% emulsifiable concentrate, 0.5 pound of 25% dieldrin WP or 0.66 pint of 18.5% EC. Dusts containing 2.5% aldrin or 1.5% dieldrin at 10 to 15 pounds actual per acre may be used. Thirty day waiting periods are required between treatment and harvest for all above materials except parathion, which is 14 days. To avoid the possibility of chlorinated hydrocarbon residue on the peel, which may contaminate cow feed, it is advisable to use parathion on trees bearing fruit.

PLANT BUG CONTROL: Plant bugs sometimes infest tangerines and early varieties of oranges. Fruit that has been attacked will turn a deep orange color and drop. Infestations occur in groves where the citron melon is present or where a leguminous cover crop has been grown. After the grove has been disced in the fall the plant bugs will attack the fruit. Plant bugs can be controlled with 0.25 pound of actual parathion per 100 gallons. The chlorinated hydrocarbons are effective but should not be used, as explained under grasshopper control.

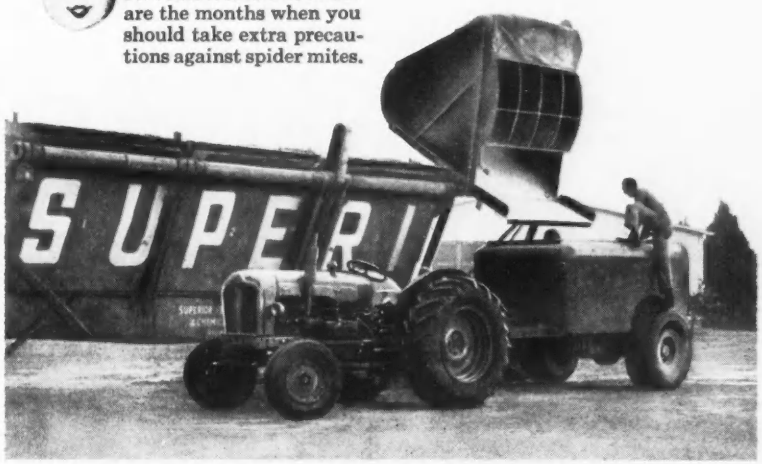
SCAB CONTROL: Scab control is important on Temples, Murcotts, Tangelos, and on some varieties of lemons and on grapefruit in the coastal areas. The control of this disease depends upon a thorough coverage of copper applied just before growth starts or at pinpoint growth. Use a copper compound at 0.75 pound of metallic copper per 100 gallons. If scab is likely to be severe, double that amount of copper. Ferbam at 1.5 pound per 100 gallons in the ⅔ petal stage is more effective than copper, but no residue tolerance has been established for this material; therefore, do not use ferbam when fruit is present.

NUTRITIONAL SPRAYS: Zinc and manganese compounds can be applied either in January or post-bloom. Where a dormant copper application is to be made, nutritional compounds can be added at that time to eliminate complications when the post-bloom spray is applied.

Consult the 1961 "Better Fruit Program" for further details concerning dosage, compatibility of mixture, precautions and regulations covering the use of pesticides.

Farm losses in 1960 were estimated at $165,000,000.00 by the U. S. Department of Agriculture.

Superior Sally says:
November and December are the months when you should take extra precautions against spider mites.



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Conner Announces Rules For Florida Agricultural Slogan Contest

Commissioner of Agriculture Doyle Conner has announced the official rules for the Florida Agricultural slogan contest and invited entries from throughout the State in the Florida product identification program.

Several weeks ago Conner made an offer of $100 to the person or firm that came up with a slogan, a mark, a phrase or symbol that would ideally promote Florida agricultural products. The offer was made during the meeting of the Florida Fruit and Vegetable Association in Miami Beach.

"Such an identification would mean more and better consumer acceptance of our quality citrus and other fruits and vegetables," said Conner, "I feel that Florida is missing a good bet by not having a proper identification of all of its quality products."

Since his initial offer of $100, the Commissioner reported that the Florida Fruit and Vegetable Association had added $100 and that there may be several other offers raising the prize money in the near future.

Each entry must be submitted individually, printed on a plain piece of paper. Name and address of contestant must be attached to each entry.

Address entries to the Florida Agricultural Slogan Contest, Department of Agriculture, State Capitol, Tallahassee, Florida.

Entries must be postmarked not later than December 31, 1961. No entry will be accepted if delivered later than January 5, 1962.

Winning entries will be selected by an independent panel of judges to be named by the Commissioner of Agriculture. The panel will be composed of representatives of various agricultural industries in Florida. Entries will be judged on the following basis: appropriateness, freshness, creativeness, effectvie use of words, and sincerity.

The decision of the judges will be final. Entries must be the original work of the contestant submitting them. Winners will be notified by mail as soon as the judging is completed.

The contest is open to anyone in the State of Florida except employees of the Florida Department of Agriculture. Prize winners will receive their awards in appropriate ceremonies to be arranged at a later date.

JIM MORTON RECALLS CITRUS FORECAST MADE IN YEAR 1911

There's always something old as well as something new of interest in, and to, Florida's billion-dollar citrus industry.

Hardly had the U. S. Department of Agriculture's October estimate of 99 million boxes of Florida oranges for the 1961-62 season hit most of the state's Pages One before a note came in from Jim Morton, one of the state's longest-timer citrusmen and a member of Florida Citrus Mutual's board of directors, harking back, so to speak.

Attached to the Morton note was a clipping of the "50 Years Ago Today" column from the Florida Times-Union, in which was this revealing item:

"Five and a half million boxes of oranges is the estimate upon which most of the railroads are basing their calculations, according to a report. If the season actually pans out as the traffic men figure, Florida will have regained the position which she held in 1894-1895 when the disastrous freeze cut down the production from six million to 75,000 boxes."

The clipping, incidentally, was passed along to Morton by "C. D." Gunn of Coon Hill, Micanopy, who's been watching these Florida citrus crops for about as long as anybody around today.

The item was taken from the Times-Union of October 3, 1911, so the railroaders' estimate obviously was made for the 1911-12 season. First USDA preseason Florida citrus estimate was made in 1916, according to Paul Shuler, USDA statistician, although there is a notation in the records that the USDA did report the actual production of the 1909-1910 Florida orange crop at 5.3 million boxes.

The reason the railroads ventured into the crop forecasting business back in those 1911 early times is that they hauled all the citrus northward that wasn't carried by boats and ships. Naturally, they wanted to get a line on how much fruit they'd get to ship.

Regardless of who predicted what back then, the citrus note of 1911 gives a pretty good idea of how Florida citrus has grown—the industry, not just fruit sizes—in 50 years.

From a forecast of 5.5 million boxes in 1911-12 to a ditto of 99 million boxes for 1961-62!

IT'S A FACT

There is no need for citrus trees to be mineral hungry between their two or three meal times each year.

You can avoid many mineral deficiencies by backing your fertilizer program with a readily available, slowly soluble mineral source.

Many thousands of growers world-wide know about agricultural slag.

1000# per acre each year on a citrus grove will return attractive dividends.

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Citrus Psylla (Diaphorina Citri Kuway)[1] And How To Control It[2]

BALDEV SINGH MANGAT[3]

Citrus fruits grown under Punjab (India) conditions often produce unsatisfactory yields. The difficulty is that the plants fail to set an adequate number of fruits. A variety of causes have been ascribed to account for this condition but it appears that the most common cause may be feeding by the citrus psylla (**Diaphorina citri Kuway**). During the past few years, this insect has been becoming more and more to be recognized as a serious pest to citrus in the Punjab. Due to the perpetual menace of this insect, the citrus industry of the Punjab is facing a great crisis.

Distribution:

This insect is widely distributed throughout the Orient, i.e., from India through China to Phillippines but has not been reported from America, Australia and U.S.S.R. It has been reported to be a serious pest of citrus plants throughout India.

Life History:

It spends the winter as an adult under leaves and is one of the first insects to become active in the spring. These brownish bugs with vertex slightly lighter are about 3.00 mm to 3.08 mm (including wings) and 0.55 mm to 0.71 mm broad (Plate 1) and can be seen all the year around on the leaves and on the flowers of practically all types of citrus plants. The overwintered adults mate and mating is generally observed to occur on the tender shoots. A female after copulation moves actively on the tender shoots for selecting a suitable site for egg laying. She explores the surface with her antennae and after finding a suitable site, the tip of the abdomen is then lowered onto the surface of the tender unfolded leaf and the egg is laid in the hole made by her strong ovipositor. The eggs are almond shaped, elongate, thicker at the basal end and tapering towards the distal end, the rounded basal end is provided with a slender stalk like process for anchoring the egg into the plant tissue (Plate I). The color of the egg is pale yellow when freshly laid but turns orange as the embryo develops. The eggs are laid during day time only, and on fresh growth, usually in the folds of the half opened leaves, axils of leaves, pushed in between the buds, stems or petioles of the leaves, auxiliary buds and on other similar situations. Eggs are found scattered on the upper and lower surfaces of the leaves. Eggs are laid singly, in groups, in clusters, as well as in single, double and triple straight lines. A single female can lay from 266.20±86.49 to 700.00±158.89 eggs during her life time, depending upon the temperature and on the availability of the tender shoots. Eggs hatch in 2.92±0.13 to 11.94±0.95 days depending upon the temperature and give rise to orange colored nymphs. The young nymphs remain congregated on the young shoots close to the seat of oviposition. For a few days they continue to feed inside the half opened leaves between the axillary buds and the stems. In the latter stages they move down to older leaves. The nymphs suck the plant juices directly and render them weak. Further, the nymphs exude honey dew from their anal aperatures which is responsible for the growth of sooty mould on the dorsal surface of the leaves which interfere with their photosynthetic activity. This exudation gives a white appearance to the ground under the tree during severe infestation. It is here that the real damage occurs, since, when feeding these nymphs inject a substance which is toxic to the plant. This causes the blossoms and young leaves to drop. In severe cases of infestation, valuable orchards are reduced to unproductive, dry wood which can be used as fuel. The nymphs undergo through five instars and become adults in 9.50±1.06 to 36.38±1.26 days depending upon the temperature. It passes through ten overlapping generations under the Punjab conditions and it is only the first generation nymphs which do the maximum damage.

Biological Control:

Of the various natural enemies, the predators help a great deal in the suppression of **D. citri** nymphs. In the Punjab both the larvae and the beetles of **Coccinella septempunctata** L., **Chilomenes sexmaculatus** F. and **Brumus suturalis** F. are found feeding upon the nymphs of this insect. These predators are most commonly met within the fields during February and March when the population of the nymphs is at its peak. The beetles of **Coccinella septempunctata** L., **Chilomenes sexamaculatus** F. and **Brumus suturalis** F. on an average take 45.71, 33.08 and 28.96 nymphs daily, respectively.

Chemical Control:

Out of the various concentrations of the insecticides tried endrin (emulsion) 0.02%, diazinon (emulsion) 0.02%, and dieldrin (emulsion) 0.045% gave from 96.56 to 100 percent mortality of both the adults and the nymphs in the fields. Endrin (emulsion) 0.02% is comparatively more economical than the other two insecticides costing only 15.38 nP per tree when the spray solution is used at the rate of two gallons per tree. Diazinon (emulsion) 0.02% and dieldrin (emulsion) 0.045% prove to be more uneconomical than endrin as their spray costs 20nP and 24nP per tree, respectively.

If growers use the inspection method for determining when to treat, they may save themselves from more unnecessary spray bills. If growers elect not to rely on their own inspection, it is recommended that treatment be applied when the first blossom buds are formed and continued at seven day intervals until a good fruit set has been secured. Three applications during February and March are probably advisable.

1. Homoptera: Psyllidae.
2. Part of a thesis presented by the author in partial fulfillment of the requirements for the degree Master of Science. The original copy of the thesis is on file in the Punjab University library, Chandigarh. Appreciation of the author is expressed for helpful suggestions by Dr. Sardar Singh, State Entomologist during the course of studies.
3. Research Assistant, University of Wisconsin, Madison, U.S.A.

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SV61-1

USDA Reports Interception Increase Of Serious Plant Pests

A 37-percent increase last year in interceptions of 14 serious plant pests regularly encountered at U.S. ports of entry has been reported by the U. S. Department of Agriculture.

These destructive pests were found in passenger baggage, ship's stores, mail, and cargo, by plant quarantine inspectors of USDA's Agriculutral Research Service, during the 1961 fiscal year that ended June 30. Among the pests was the khapra beetle — one of the world's most damaging pests of stored grain. This beetle was intercepted 202 times, compared with 131 times in fiscal year 1960.

The Mediterranean fruit fly, deadly enemy of the Nation's $400-million-a-year citrus industry and of other southern fruit and vegetable crops, was found 195 times, compared with 163 times the year before.

Figures on interceptions of 12 other serious pests during 1961, compared with 1960, were: Black spot of citrus, 225 and 109; citrus canker, 127 and 139; European cherry fruit fly, 69 and 20; golden nematode, 29 and 19; Mediterranean land snail, 64 and 75; Mexican fruit fly, 151 and 170; oriental fruit fly, 22 and 10; olive fruit fly, 57 and 52; pink bollworm, 33 and 15; sweet orange scab, 163 and 97; West Indian fruit fly, 142 and 120; and yanone or Japanese scale, 467 and 313.

In addition to these regularly encountered pests, the chafer **Melolonthamelolontha** (L.), rarely found in past years, showed up 28 times during 1961. This relative of the Japanese beetle causes extensive crop damage in parts of Europe but has never become established in this country. Most of the interceptions of the chafer last year were made between April 6 and 25 on planes landing at the New York International Airport and airports at Boston, Chicago, and Anchorage, Alaska, and at Bradley Field, Conn., and McGuire Air Force Base, N. J.

In all, more than 25,000 plant pests were intercepted at U.S. ports of entry last year — an average of one every 20 minutes around the clock.

More than 323,000 lots of prohibited plant material — an average of one lot every 90 seconds — were seized at seaports, airports, and border crossings to prevent the entry of these and other dangerous plant pests. The number of seizures represented an increase of 3 percent over the previous year and 9 percent over the average for the past five years.

Most of the plant pests and unauthorized plant materials arrived in passenger baggage. ARS inspectors, cooperating with U.S. Bureau of Customs inspectors, examined nearly 23 million pieces of incoming baggage — an average of one inspection every 1½ seconds. The number of ship and air passengers whose baggage received plant-quarantine inspection during 1961 was 3 percent higher than it was in 1960. Inspections of vehicles entering the U.S. from Mexico last year increased 7 percent over the year before.

ARS inspection and certification of commodities for export, to meet the requirements of importing countries, also increased last year. Slightly more than 36,000 export certificates were issued for 226 commodities going to 158 countries, compared with slightly less than 35,000 certificates issued for 110 commodities exported to 129 countries the year before.

Pest-infested or contaminated nonplant cargoes also required increased attention during fiscal year 1961. Because of infestations of the khapra beetle alone, 38 ships and 66 lots of general cargo from outside the U.S. were fumigated. In addition, fumigation of large quantities of general cargo was required because of contamination by snails.

Florida Leads World In Citrus Production

Florida still leads the world in the production of oranges, grapefruit and tangerines, according to a University of Florida economist.

Zach Savage, economist with the Florida Agricultural Experiment Stations, reports Florida produced 29 percent of the world crop in the 1960-61 season.

The Sunshine State accounted for 75 percent of the United States' production last season, with 123,800,000 boxes of these three kinds of citrus.

Spain was second in production with 43,860,000 boxes, all of which were oranges, followed by Japan, Calfiornia, Brazil, Italy, Argentina, Mexico, Morocco and Israel.

Florida and California produced 36 percent of the world crop and the 8 countries accounted for 46 percent.

Savage says Florida produced 25 percent of the world crop of oranges and tangerines.

Florida produced 31,800,000 boxes of grapefruit in 1960-61 which was 64 percent of the world crop. Texas was second, followed by California, Arizona, Israel, Trinidad and Tobago.

Polk County Boy Sets Outstanding Corn Production Record

Francis Preston, former Bartow boy, now farm manager for the Norris Cattle Company's huge Oklawaha farm in Marion county near Ocala, received feature notice in this month's issue of Florida Grower and Rancher because of his outstanding record of corn production.

Preston's record of corn production ran from 90 to 140 bushels per acre for an average of 120 bushels. 2080 acres of land were planted to corn this year.

He stressed the necessity for keeping a close watch on the crop and the need for controlling weeds in the fields.

"Growing conditions vary from year to year, but the proper preparation of the soil, using the necessary fertilizer and protecting the crop from insects will have a marked bearing upon the quality and quantity of your crop."

Preston has just returned from a trip to Ohio, Illinois and the Dakotas and Montana to inspect new types of farm machinery and to see how huge pastures were developed in those areas.

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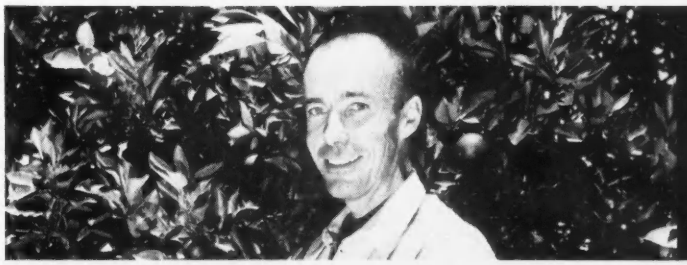

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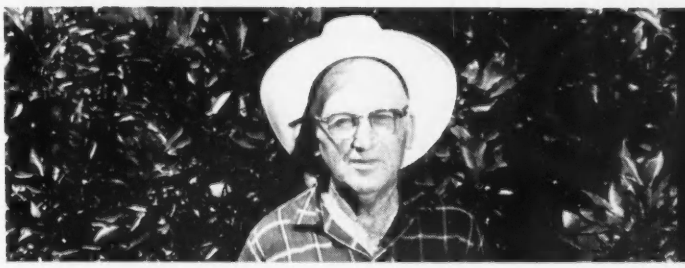

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USDA Predicts 99 Million Boxes Of Oranges For 1961-62 Season

The United States Department of Agriculture has forecast a record production of oranges for this season. The department predicts that there will be a crop of 99 million boxes of oranges for the 1961-62 season.

This prediction is made in spite of the extreme dry spell which has prevailed over the citrus belt the past several weeks. It is more than twelve million boxes over the crop harvested last season.

As is customary there is some debate among citrus growers that in view of the drouth this season the state could produce 99 million boxes of oranges and express doubt if the forecast took into adequate consideration the recent dry weather which will result in smaller fruit sizes.

The USDA's report noted that the estimate includes 8 to 9 million boxes of late bloom oranges which are customarily smaller and lighter than normal bloom oranges and will not be harvested until near the end of the season. The effect of the possibility or rains during the balance of the season which might cause some fruit splitting would reduce the crop figure as estimated. The next estimate is due November 10.

Grapefruit Conditions

The grapefruit crop for the present season was forecast at 35 million boxes which is 3.4 million boxes more than last year's crop.

Florida Citrus Mutual indicated the possibility of 93 to 97 million boxes of oranges for the purpose of predicting average prices for the season.

Robert Rutledge, executive vice president of Florida Citrus Mutual, said the crop estimate was only slightly higher than most industry thinking and planning since August.

Homer E. Hooks, general manager of Florida Citrus Commission indicated that the 99 million box crop estimate was somewhat higher than many people in the industry thought it would be, although the grapefruit and tangerine estimates were close to what the Commission figured for budget purposes.

The forecast on tangerines indicated a crop of 3.8 million boxes for the season which is 1.1 million boxes less than last season.

As the result of the damage done by hurricane Donna last year, citrus prices are higher than was anticipated.

The USDA crop reporting board in Washington made these comments on the estimates: "Florida figures will include 8 to 10 percent of oranges from late bloom fruit and from 6 to 7 percent of grapefruit from late bloom fruit.

"Most of the late bloom fruit is May and June bloom with less than 1 percent of the July and August bloom maturing into marketable fruit. Late bloom fruit in general lacks size and weight at maturity."

The USDA issues its first estimates of the season in early October each year. The highest such estimate on record was in 1957 when an orange crop of 102 million boxes was forecast.

A breakdown on the orange and grapefruit estimates released reported:

— Early and midseason orange varieties, 49 million boxes, up 2 million from last season's crop; Temples, five million, up 1.5 million; Valencias, 45 million, up 5 million.

— Seedless grapefruit, 22 million, up 3 million; pink, 7.7 million, up 400,000; white, 14.3 million, up 2.4 million; others, 13 million, up 600,000.

No estimate was given on California's orange production, and 1,300,000 boxes of grapefruit was forecast for the Desert Valley area.

The Texas grapefruit crop was expected to hit 6.5 million boxes, down 200,000 boxes from last season. The Texas orange estimate was 3.7 million, up 200,000.

The Florida lime crop was estimated at 330,000 boxes and the Florida tangerine crop at 3.8 million boxes.

1.3 Per Cent Error

During the five-year period from 1955 through 1959, the USDA erred an average of 1.3 per cent in its initial forecasts of seasonal orange production.

Compared to final actual production, the USDA's Oct. 1 estimates were an average of 1.2 million boxes too high.

Rutledge Comments

A recent article in "The Triangle," Florida Citrus Mutual weekly publication, asserted that the 1961-62 season "might well turn out to be the Year of Economic Maturity for the Florda Citrus Industry."

The premise was based on increasingly manifest evidence that growers, particularly, are more than ever determined to make the positive decisions on production, research, advertising and marketing to insure that "prudently planned growth" shall be the business philosophy of their industry.

Now comes an expression from outside the industry that the 1961-62 season starts out as the year of increasingly mature independence for the industry.

Editorially commenting on the calmness with which industry leaders view the federal government's October Florida crop forecast, which predicted the largest orange crop at 99,000,000 boxes in the state's history, the Tampa Tribune concluded:

"Florida's economy has reached a

(Continued on Page 29)

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Reports Of Our Field Men . . .

HILLSBOROUGH, PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

Rains are our problem again in this section of the state. Our growers are irrigating and have been irrigating for a number of days now. Rainfall has been very scattered and confined to a very small area ranging from .03 of an inch to 1.5 inches. These rains were in a period of two days apart and fell last week. At this time, those have been dissipated because it was so dry when they came.

Citrus trees have suffered considerably and the size of fruit is small.

I have noticed in those areas that had the rains last week the fruit is beginning to show splits, which means that with frequent rains we could experience a lot of splitting. Have noticed some fruit being picked here and there in this area. According to the quotations I can gather, the price for on the tree is no different than it was before the USDA estimate came out.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glendale 3-4537
Avon Park, Fla.

We are still plagued with dry weather in this area. On October 13 and 14 there were showers around but so little it was not of much help. Amounts of from .2 to 1 inch were reported with one exception which received about 3 inches over a small area east of Wauchula. Irigation plants are going night and day with some reports of lowering water levels in wells.

This lack of moisture has kept fruit size down and also reduced the last flush of growth before winter. Fruit has broken in color well and looks as if maturity is generally earlier than usual. Fruit movements continue to be good, which reveals this fact. If we could get some rains with the cooler weather all phases would be helped.

Most all young trees have been fertilized and plans are to get into the fertilization of bearing groves as soon as possible. It looks like it is going to be a schedule of irrigating, fertilizing, disking and irrigating again. Hope, however, we will get some rains before this has to be done. Careful consideration will be given to assure the trees getting a proper balanced feeding.

WEST HILLSBOROUGH, PASCO AND PINELLAS COUNTIES

Calvin P. Lloyd, III
Tampa, Fla.

The dry weather in this area is the biggest problem facing the citrus grower at this time—October 17th. Many growers have already started irrigating their groves for the second time. The froves that have irrigation facilities look good, but those that have not been irrigated are in a bad wilt and some have dropped a little fruit.

The rust mites have slowed down in the groves, but the red spiders are starting to show up with these few cool days.

Most of the growers have already cut the cover crop into the soil and are in the process of applying the fall application of fertilizer.

Some fruit shipments have started in this area, but it will be a few more weeks until our fruit begins to move in any great volume.

HIGHLANDS AND POLK COUNTIES

Jack Rubush and Gene Swearingen
P. O. Box 1304
Winter Haven, Fla.

At the time of this writing, our rainfall has been very short. Almost all grove care functions have stopped for irrigation. We hope that some rain may come in near future to relieve this drouth.

Due to the dry weather the growers may have the problem of small fruit and after some rainfall, this moisture may cause splitting of all orange varieties. This is not caused by your fertility program, but due to lack of moisture from the drouth.

Most of the groves' cover crop is cut under by now and the fertilizer machines are beginning to roll. It is time to get your fall application on and cut in. We hope that the winter cold will give us a break so that we can get our groves in top condition for spring growth and bloom.

We still have the problem of Rust mite and will be confronted with both Texas and purple mite. If you use sulphur for your Rust mite control, keep a close lookout for a quick build-up of purple and Texas mites which can cause considerable damage to your trees. Where there is a heavy population you can have some "firing," falling of the leaves. If you can catch the purple and Texas mites before they build up, you can use Tedion for long control. If you run into a heavy population, you need a quick kill and Trithion should be used.

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

R. C. Revels, Jr.
P. O. Box 3332, Apollo Beach, Fla.

Some light showers have eased the extreme dry situation in some groves, however only a few areas have received any relief. Most of the young groves have been showing wilt for over two weeks and some will start losing their leaves if relief doesn't come very soon. Fertilizing of young groves is completed in this area but only a few of the growers are putting on the fall application on bearing groves yet due to the dry spell. Mites have started on an increase now and a very close watch should be kept on this as damage is worse during dry weather. Chlorobenzilate and Tedion do a good job in cleaning up these mites this time of year.

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We are beginning to have scattered showers which is fine for the growers. Most groves have been worked, and look very good except for dry weather, and fruit hasn't sized. We have several ages of fruit which will be very bad in picking. Some fruit has already been picked, but not enough to speak of. Growers have been very busy watering young trees, spraying, and dusting for scale and rust mite.

ADVERTISEMENT — LYONS FERTILIZER COMPANY

Uncle Bill Says:

We're jist 'gittin' another citrus season under way and while they has been a long dry spell the expert counters say we'll have a crop of about 99 million boxes of oranges which is a heap of oranges in anybody's language, but the fellers who forecasts the prices say that the big orange crop ought to bring purty good prices, and with that big a crop it ought to put a lot of money in the growers' pockets.

And like we've said a lot of times before in spite of all the handicaps us growers has to contend with, like weather, pests, storms and what-not this business of producin' citrus is one of the best businesses in the world.

In addition there is prospects of a good vegetable crop this season, while cattle folks is raisin' better pastures now than they have ever developed by usin' the right sort of fertilizer to make the grass grow and fatten their cattle.

'Course Florida is goin' through the throes of industrial development now the like of which it has never known before, but with all this the prospects fer our state's fine citrus and vegetable crops looks mighty good.

One thing that is fer sure, growers is doin' their very best to produce the market with the best quality crops it is possible to raise, and while it takes some money to get the very best crops to market it shore pays off.

On account of the drouth the fall fertilizer application has been a little later than usual, but we'll bet the weather begins to behave before long and that there'll be a big rush to feed our trees and crops the right sort of feed to keep 'em healthy and strong.

And of course the best way is to feed 'em Lyons Fertilizers so they will Produce Maximum Crops of Finest Quality.

Twenty-Seven Years Of Orange Costs And Returns

(Concluded From Last Issue)

The price received for fruit in 1947-48 was 54 cents per box, the lowest of these seasons. There were 14 seasons in which the per-acre returns were less than the average for the period and there were 16 seasons when the per-box returns were less than the average. Fruit returns were $536.89 per acre in 1948-49, an increase of 190 percent over the previous season.

Another increase of 30 percent in 1949-50 brought fruit returns to $695.92 per acre, which was the second highest of the 27 seasons. Likewise the returns per box showed an increase and was 54 cents in 1947-48, $1.58 in 1948-49, and $2.11 in 1949-50. The latter price is 3.9 times that for 1947-48. The price dropped to $1.53 in 1950-51 and 90 cents in 1951-52. The price for all fruit was $2.17 in 1957-58.

Yield and price determine the per-acre returns from fruit. High yields and high fruit prices resulted in pyramided returns per acre during the 13 seasons of 1942-46, 1948-51, and 1952-58, so much so, that the average of the 27 seasons was above any of the other 14 seasons. Average returns per acre for these 13 seasons was 3.9 times the averages for the first ten years of these records.

There were four groves in 1957-58, 8 percent, that had returns from fruit less than $200 per acre, and 18 groves, 37 percent, with returns from fruit less than $400 per acre. Forty-four percent of the groves had from $400 to $799 returns from fruit per acre. The range was from $66.20 to $1424.83 per acre, and the average was $593.33.

The average on tree price received in 1957-58 was $2.17 per box. The range in price was from 61 cents to $4.20 per box. Six percent of the groves had an average fruit price of less than $1.00 and 50 percent received less than $2.00 per box. Twenty-one percent had an average fruit price that exceeded $3.00. The price received varied with a number of factors including variety of fruit, whether processed or sold fresh, managerial salesmanship, internal and external fruit quality, extent of freeze damage, fruit size and total volume produced.

Returns above operating costs dropped from $712.68 per acre in 1945-46 to $121.42 the following season, a drop of 83 percent. Yet there were nine of the 27 seasons of these records that averaged lower returns above ouerating costs than in 1946-47. There were 11 seasons, 1942-46, 1948-51, 1953-56 and 1957-58 with income above operating costs exceeding the average for all seasons. There were 10 seasons that had income above operating costs per box higher than the 89-cent average.

There was one season, 1947-48, when operating costs exceeded returns from fruit. The returns above operating costs per acre ranged from −$8.02 in 1947-48 to $712.68 in 1945-46 and averaged $243.31. There were eight seasons, 30 percent, when returns above operating costs were less than $100 per acre and eight seasons, 30 percent, when less than 40 cents per box.

There was considerable difference between the average returns above operating costs per acre for the first 10 seasons, $79.34, and for the remaining 17 seasons, $339.76. The latter figure is four times the former. Average returns above operating costs per box for the latter period was 223 percent of the former period (105 and 47 cents, respectively).

Returns above operating costs were the lowest in 1947-48 of the 27 seasons, when the returns from fruit lacked $8.02 of paying operating costs. On a per-box basis, the loss was two cents. During this season there were 21 groves, 44 percent, on which the fruit did not return operating costs. However, the following season, 1948-49, all groves returned operating costs. In 1951-52, 9 groves, 17 percent, failed to return operating costs and in 1956-57, 9 groves or 21 percent. There were four seasons of these 27 when each grove returned operating costs. Twenty-three percent of these groves returned less than $100 per acre above operating costs and 50 percent less than $300 in 1957-58. Thirty-three percent returned more than $500 per acre above operating costs.

In the 1957-58 season 21 percent of these groves returned less than 50 cents per box above operating costs and 42 percent less than $1.00. The variation was from a loss of $3.30 per box to a net of $3.12 and returns above operating costs averaged $1.46 per box.

At the rate of returns above operating costs in 1946-47, 30 acres of grove would be necessary to return $3,600 to the owner for interest on the grove investment, interest on borrowed money, his own supervision and profit, if any. However, at the 1948-49 rate of returns above operating costs, only 10 acres would be required for a return of $3,600; in 1949-50, 7 acres; in 1950-51, 11 acres; in 1951-52, 26 acres; in 1952-53, 15 acres; in 1953-54, 12 acres; in 1954-55, 12 acres; 1956-57, 16 acres and 1957-58, 10 acres.

There were nine of these 27 seasons when returns above operating costs were lower per acre than in 1946-47 and 19 when they were lower than 1948-49. The averages for these two groups were $52.54 and $140.91 per acre, respectively. At $52.54 per acre returns above operating costs, 69 acres would be necessary to net $3,600 while 26 acres would be necessary at the rate of $140.91 per acre, and 15 acres at the 27-year average of $243.31.

Interest on grove valuation has been figured at 6 percent since the inception of this project. Each cooperator was asked for his estimate of the valuation of his grove when considered as a long-time fruit-growing enterprise. The results were that conservative figures were given and there has been a reluctance on the part of the cooperator to change his valuation even after a substantial change in fruit prices and grove sale prices. Interest on grove valuation by seasons varied from $31.33 per acre in 1942-43 to $78.02 in 1956-57. The average was $49.06 for the 27 seasons. Interest per box varied from 10 cents in 1943-44 and 1945-46 to 40 cents in 1932-33 and averaged 18 cents.

Interest in 1957-58 averaged 29 cents per box. One out of 25 groves had interest charged at less than $54 per acre and 11 percent at less than $66. Seventy-one percent had interest charged from $78.00 to $103.34 per acre.

Total cost without owner supervision is made up of five items included as operating costs plus the item of interest on estimated grove valuation. This item of interest added 38 percent to the operating costs on the average. Another way of stating the same thing is that on the average the total cost without owner supervision was 38 percent higher than the operating costs.

This increase varied from 22 percent in 1947-48 to 91 percent in 1932-33 and did not amount to less than 40 percent until the 1942-43 season. During the six seasons of 1942-50, this increase in interest charged amounted to 30 percent or less. Interest was highest in 1956-57 at $78.02

per acre but was only 38 percent of the operating cost.

The distribution of costs per acre with owner supervision omitted for the 1957-58 season shows such costs averaged $272.44 that season. Six percent of the groves had such costs of less than $175 and 44 percent with less than $250. All groves averaged $1.00 per box in 1957-58 with one out of 10 having such costs of less than 50 cents and 48 percent with less than $1.00. Twenty-nine percent of these groves had such costs of $1.50 or more.

Net returns in this study mean the amount left to the grower of his returns from fruit after paying operating costs and interest on the grove valuation. It is the amount left for owner supervision and profit, if any. There were two of the 27 seasons when returns from fruit failed to pay total cost without owner supervision and another season, 1937-38, broke even. There was one of these seasons when operating costs were more than returns from fruit.

Net returns per acre ranged from –$51.19 in 1947-48 to $676.37 in 1945-46, and averaged $194.25. The first five years of these records, 1931-36, averaged $24.30 per acre for net returns. The 1936-41 period averaged $59.21; 1941-46, $432.58; 1946-51, $231.59; and 1951-56, $215.98 per acre. There were 7 seasons, 26 percent, with average net returns of less than $50 per acre. There were 7 seasons, 26 percent, with net returns of less than 20 cents per box, and five seasons had net returns of $1.30 or more per box. The average was 71 cents per box with 10 of the 27 seasons exceeding this amount.

USDA PREDICTS 99 MILLION BOXES ORANGES FOR '61-'62 SEASON

(Continued from Page 24)

healthy state when a record crop estimate does not upset the optimism its citrus men feel for the new season —and when in an era in which so much of agriculture is becoming more and more dependent upon USDA (U. S. Department of Agriculture) intervention, the citrus industry can exhibit its increasing independence of big government."

Over the past 10 years Mutual's Bob Rutledge has repeatedly pointed out that these government "crop forecasts are merely that—forecasts. They are positively not the laws and the gospels by which this industry must conduct its economic affairs. The sooner we assert our freedom from these predictions the sooner will we become a completely independent, mature and progressive industry."

FLORIDA CANNERS HOLD 30th ANNUAL MEETING

The Florida Canners Association concluded its 30th annual meeting naming a Winter Haven citrus executive as head of the organization for the coming year.

Named president was Herschel Sorrells, president of Adams Packing Co., of Auburndale. The three-day meeting concluded Saturday night with a banquet honoring new officers. It was highlighted with an award of an all-expense paid trip to Europe for one of the registered FCA members.

On the huge stage of the Diplomat Hotel the prizes were announced by two lovely models from Cypress Gardens.

The industry-sponsored Florida Citrus Exposition provided two giant cans out of which the girls stepped into the spotlight with scrolls announcing the prizes. Homer Hooks, general manager of the Florida Citrus Commission, awarded both the $3,000 European trop and also an all-expense paid trip to the Bahamas which was the second prize.

The convention opened Thursday with business meetings ending Friday night. The FCA held a golf tournament at the Hollywood Country Club for women and at the LaGorce Country Club in Miami for men.

In addition to Sorrells, officers for the coming year are: Bruce Skinner of Clearwater, vice president; Reid W. Jenson of Ft. Pierce, second vice president; and Jerry Brown of Eustis, treasurer. C. C. Rathbun of Winter Haven was renamed executive vice president and Joe C. Fuller was named secretary.

TRAVELLING BILLBOARDS TO ADVERTISE FLORIDA ORANGE JUICE

An ingenious idea in the mind of a Florida Citrus Commission executive will literally put thousands of "travelling billboards" on the nation's highways advertising Florida orange juice — at little or no cost to the State's citrus industry.

Harold S. Gardner, Commission advertising manager, figures each truck with giant posters attached on the sides, will travel over 10,000 miles each month, carrying the Florida citrus message to millions of persons in every far-flung corner of the country and Canada. Over fourteen hundred truck-trailers will be rolling more than 14 million miles per month, Gardner said, proclaiming that the truck is "Loaded With Vitamin C — Florida Orange Juice."

"The estimated value of this much advertising space would run between $200,000 and $330,000," Gardner pointed out.

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FLORIDA ORTHO®
CITRUS SPRAY PROGRAM

Dormant Spray *(December 20 to February 10)*

ORTHO Nutritional S-C-Z-Mn-B Spray No. 2	**Dosage:** 60 lbs./500 gals.	**Controls:** Citrus Rust Mite, Scab, Melanose, Copper, Zinc, Manganese, Boron Nutrition—Yellow Spot
ORTHO Sodium Molybdate	**Dosage:** 5 ozs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: ORTHO Spray Sticker has proven especially beneficial in sticking nutritional sprays.

Post Bloom Spray *(from ⅔ petal fall until fruit reaches ½" in diameter)*

ORTHOCIDE 50 Wettable	**Dosage:** 10 lbs./500 gals.	**Controls:** Fruit Set, Foliage Growth, Melanose, Scab, Black Scale, Florida Red Scale, Purple Scale, Citrus Rust Mite, Fruit Russet, Citrus Red Mite, Texas Citrus Mite, Six Spotted Mite, Aphids, Mealybugs, Fruit Worms
ORTHO Parathion 8 Flow Concentrate	**Dosage:** 20 ozs./500 gals.	
ORTHO Zineb 75 Wettable	**Dosage:** 3 lbs./500 gals.	
ORTHO Trithion 4 Flowable or		
ORTHO Ethion 4 Flowable	**Dosage:** 40 ozs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: In recent years, minor pests, including Aphids, Mealybugs, Fruit Worms, Black Scale, have become increasingly important to control. Parathion in the post bloom spray prevents the build-up of these pests. If preferred, ORTHO Malathion may be substituted.

Summer Spray *(July 1 to July 31)*

FLORIDA VOLCK Soluble Oil Spray	**Dosage:** 5 gals./500 gals.	**Controls:** Florida Red Scale, Purple Scale, Black Scale, Citrus Red Mite, Texas Citrus Mite, White Fly, Sooty Mold, Greasy Spot, Citrus Rust Mite, Fruit Russet
ORTHO Zineb 75 Wettable	**Dosage:** 5 lbs./500 gals.	

Note: Check with your local ORTHO Fieldman for other available phytonomic oil sprays. Florida Red Scale is best controlled between July 15 and July 31. If the interval between the Post Bloom Spray and the Summer Spray is extended to an aerial application of ORTHO Trithion 4 Flowable or ORTHO Trithion – Sulfur dust formulations may be needed for control of rust mites and spider mites prior to the Summer Spray.

Fall Spray *(October 1 to November 15)*

ORTHO Tedion® 25 Wettable	**Dosage:** 2½ lbs./500 gals.	**Controls:** Citrus Red Mite, Texas Citrus Mite, Fruit Russet
Chlorobenzilate 25 Wettable	**Dosage:** 2½ lbs./500 gals.	
ORTHO Spray Sticker	**Dosage:** 40 ozs./500 gals.	

Note: In groves where greasy spot is a problem, protection of the late summer-early fall flush may be necessary. ORTHO PHALTAN 50 Wettable and ORTHO Copper 53 Fungicide combined with ORTHO Spray Sticker are recommended for this use. Consult your local ORTHO Fieldman for information on the proper rates and timing.

Florida growers report top results with ORTHO program

"We've increased production 25% and doubled quality with an ORTHO Program," says James H. Dickinson, partner and production manager, Wardlaw Bros.-Dickinson, Frostproof, Florida. Many other Florida growers are getting results like these, because the ORTHO Citrus Spray Program gives you top-quality products, plus all the benefits of ORTHO Field Service.

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